Course

Advanced Supply Chain Management

Course code	YSS-32806
Period	5
Contact persons	Dr. K.G.J. (Karin) Pauls-Worm (ORL)
Lecturers/ Examiners	Prof. Dr. J.M. (Jacqueline) Bloemhof (ORL)
	Dr. K.G.J. (Karin) Pauls-Worm (ORL)
	Prof. Dr. ir. M.P.M. (Miranda) Meuwissen (BEC)
	Dr. ir. Y. (Yann) de Mey (BEC)
	Dr. C.N. (Cor) Verdouw (INF)
	Dr. S.A. (Sjoukje) Osinga (INF)
	Prof. Dr. J.H. (Jacques) Trienekens (MST)
	Dr. A. (Andres) Trujillo Barrera (MCB)
Language of instruction	English
Assumed prerequisite knowledge	Decision Science 1 (ORL-20306)
	Supply Chain Management (MST-24806)
Secretariat	Leeuwenborch building
	Room 6033
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Profile of the course

Advanced Supply Chain Management (ASCM) is an advanced course in the field of Operations Research & Operations Management. The course is obligatory in the specialisation Business Studies of the MME program and part of the MFT program at Wageningen University. ASCM provides a theoretical basis for multi-disciplinary analysis and improvement of food supply chains and networks, focusing especially on supply chain modelling methods to support managerial decision making. Food and agribusiness supply chains are often globally interconnected systems with a large variety of complex relationships. This is also affecting the ways in which food is produced, processed and delivered to the market.

The course builds upon the quantitative modelling skills provided in ORL-20306 "Decision Science I" and qualitative concepts discussed in MST-24806 "Introduction to SCM".

Continuation courses for ASCM are: BEC-30306 Advanced Agricultural Business Economics, INF-31306 Information Systems and ORL-30806 Operations Research and Logistics.

Learning outcomes:

After successful completion of this course, students are expected to be able to:

1. Apply presented algorithms and techniques to calculate an answer for a provided decision problem;
2. Apply supply chain concepts from logistics, information science and economics in provided business cases;
3. Construct a quantitative model for a presented decision problem in the supply chain;
4. Evaluate the interactions between the various supply chain processes and the impact of these interactions on decision making.

Learning materials and resources:

- Required book: *Supply Chain Management, Strategy, Planning & Operation,* Sunil Chopra, Peter Meindl, 6th Edition, Pearson Education, 2016 (paperback), ISBN-13:9781292093567, available at the WUR shop.
- Lecture notes and other relevant information will be provided on the Blackboard site of this course.
- If you need to refresh your knowledge on Decision Science I (ORL 20306), it is required to study chapters 2 and 3 of the book *G.D.H. Claassen,T.H.B. Hendriks, E.M.T. Hendrix (Eds), 2007, Decision Science, Theory and applications, Wageningen, The Netherlands: Wageningen Academic Publishers, (Mansholt Publication Series 2) - p.15 – 94.*

Educational activities:

The programme consists of a combination of four different work forms; lectures, computer practicals, tutorials and independent study in which a variety of Supply Chain Management concepts and models are addressed.

- *Self study*
  The total number of contact hours comprises only a part of the 6 credits. Experience has taught that keeping up with the subjects and studying during the lecture period is much more effective and efficient than a great study effort shortly before the exam.

- *Lectures*
  The lectures focus on understanding supply chain concepts and formulate quantitative models. In order to prepare for the lectures homework will be assigned on Blackboard. With a pre-class test the gained knowledge will be tested to be able to focus in the lectures on concepts, models and algorithms. The added scores of all pre-class tests, minus the worst test result, count for 10% of the final grade for this course.

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- *Computer practicals.*
  In practicals, students work with computer software in groups of two to model supply chains and to optimize, simulate and evaluate the impact of supply chain options. Knowledge on EXCEL and its add-ins is required for the practicals. Attendance and active participation during the practicals counts for 10% of the final grade for this course.

- *Supervised tutorial sessions*
  The tutorials give ample opportunity to practice modeling skills using examples from the book.

Assessment strategy (Examination):

	Learning outcomes \ where assessed?	pre-class tests	practicals	written exam
1	Apply presented algorithms and techniques to calculate an answer for a provided decision problem	X	X	X
2	Apply supply chain concepts from logistics, information science and economics in provided business cases	X	X	X
3	Construct a quantitative model for a presented decision problem in the supply chain	X		X
4	Evaluate the interactions between the various supply chain processes and the impact of these interactions on decision making		X	
	Contribution to final mark (%)	10	10	80

The final grade is based on:
- written exam (80%);
- pre-class tests (10%);
- practicals in group work (10%).

The written exam requires a minimum of 44 out of 80 points to pass.

The written exam tests the knowledge on supply chain concepts and quantitative models and the ability to interpret outcomes of decision support systems. The exam is a closed book exam – you are recommended to bring a **non-programmable calculator** (no mobile phone allowed).
The written exam has to be passed with a score ≥ 44 out of 80 points.

For most lectures a pre-class test is available on Blackboard to test the knowledge and understanding gained from homework. The lectures will build upon this knowledge. A test contains 10 questions and takes at most 15 minutes. Every test is available from Tuesday 18:00 hours in the week before the lecture until 23:55 hours of the day before the lecture (Sunday or Monday). The scores of the pre-class tests are only valid during two academic years.

The computer practicals focus on the application of decision support and modelling tools in practical situations. With active participation in group work during the practicals and handing in the closure assignment 10 points at maximum can be obtained, only valid during two academic years.

Exams are corrected by the examiners. Final marks are determined in the end by the coordinator in consultation with all involved examiners.

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Principal themes of the content:
The principal themes of the lectures, tutorials and practicals are:
1. Logistic network configurations (week 1)
2. Inventory management (week 2)
3. Financial management (week 3)
4. Risk and revenue management (week 4)
5. IT for supply chain management (week 5)
6. Planning in the supply chain (week 6)
7. Marketing and organisation in the supply chain (week 6)

Outline and schedule of the course programme:

WEEK 1.

LECTURE Introduction ASCM (Karin Pauls)
This lecture starts with a set-up of the course. Further we provide an overview of the lessons learned in the course "Supply Chain Management" (MST 24806); main emphasis will be given to value propositions, chain processes, the customer order decoupling point and performance measurement.

Background Reading:
- Chapter 1 (Understanding the supply chain);
- Chapter 2 (Supply Chain Performance; Achieving Strategic Fit and Scope).

LECTURE Designing the supply chain network (Jacqueline Bloemhof)
This lecture discusses a set of frameworks and tools used to design supply chain networks. What options do we have to improve the supply chain network at the strategic, tactical or operational level? This lecture will focus on the main strategic logistics decision that is to be taken: logistics network configuration (LNC).

Read in advance:
- Chapter 4 (Designing distribution networks and applications to online sales)

LECTURE Logistic network configurations (Jacqueline Bloemhof)
This lecture is devoted to formulating quantitative models for facility location and capacity location.

Read in advance:
- Chapter 5 (Network Design in the supply chain)

PRACTICAL Logistics network configurations (Jacqueline Bloemhof/Karin Pauls)
We will use the central pork case to formulate the decision problem, build the quantitative model and implement it in Excel, using the Solver add-in. You will perform sensitivity analysis with the model to learn about robustness issues and to be able to transform the model results into management advice. This practical will take a maximum of 4 hours.

TUTORIAL Logistic Network Configurations (Jacqueline Bloemhof)
In this tutorial we will focus on how to use optimization for facility location and capacity allocation decisions. We will work through some exercises on how to formulate location/allocation models to solve these problems.

Make in advance:
- Exercises provided on blackboard

WEEK 2.

LECTURE Inventory Management in the supply chain: economies of scale (Karin Pauls)

In Inventory Management one decides for each stocking point in the supply chain when to reorder and how much to order so that the annual relevant cost is minimized. We will discuss why inventory is held in the supply chain and how to order the right quantity at the right time, for a single product and for multiple products.

Read in advance:
- Parts of Chapter 11 (Managing Economies of Scale in a Supply Chain: Cycle Inventory)

LECTURE Inventory Management in the supply chain: managing uncertainty (Karin Pauls)

The lecture will focus on dealing with uncertainty in the supply chain. We will discuss how to improve product availability in the supply chain. We consider different order policies and how to determine a safety inventory for different cases.

Read in advance:
- Parts of Chapter 12 (Managing Uncertainty in a Supply Chain: Safety Inventory)

PRACTICAL Inventory management (Karin Pauls)

We introduce uncertainty and perishability in the supply chain and its consequences on the order policies and on product availability. Discrete event simulation is used to play with simulation models in Excel and learn about the impact of uncertainties.

TUTORIAL Inventory management (Karin Pauls)

In this tutorial we will focus on lessons learned in the practical and on the links with other topics in the course. We will work through some exercises of Chapters 11 and 12.

Make in advance:
- Exercises provided on blackboard

WEEK 3.

LECTURE Supply chain finance (Miranda Meuwissen)

Supply chain finance is getting increasingly important as an alternative source of finance as banks are getting more conservative, especially in food and agri supply chains. When acquiring chain finance, transparent information about performance metrics is crucial. We will also discuss the usefulness of blockchains from a finance perspective.

Read in advance:
- Chapter 3 (Supply chain drivers and metrics)

LECTURE Financing foreign transactions (Yann de Mey)

This lecture will focus on the financial implications of operating international supply chains. We will more closely invest the implications of exchange rate swings and discuss various issues such as transfer of ownership (incoterms), financial risks, the taxing of shipped goods and the implications of off shore constructions.

Read in advance:
- Chapter 3 (Supply chain drivers and metrics)

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PRACTICAL Financial management (Miranda Meuwissen/Yann de Mey)
Linear programming models will be used to optimize working capital and look at the impact of reverse factoring.

TUTORIAL Financial management (Miranda Meuwissen/Yann de Mey)
In this tutorial we will reflect back on lessons learned in the practical session and identify links with the other topics in the course. We will additionally work through some exercises of Chapter 3.

WEEK 4.

LECTURE Risk management (Yann de Mey)
This lecture focuses on (i) defining risks in (global) supply chains; (ii) explaining different strategies that may be used to mitigate or share those risks; and (iii) understanding the methodologies used to evaluate supply chain risks. Both the individual company as well as an integrated supply chain perspective will be presented. Examples are from food and non-food chains.

Read in advance:
- Chapter 6 (Designing Global Supply Chain Networks)

LECTURE Revenue Management (Miranda Meuwissen)
This lecture aims at understanding the role of revenue management in a supply chain. We will also identify the conditions under which revenue management tactics can be effective and the trade-offs that need to be made.

Read in advance:
- Chapter 16 (Pricing and Revenue Management in a Supply Chain)

PRACTICAL Risk and revenue management in food supply chains (Miranda Meuwissen/Yann de Mey)
In tthis practical we will work through a number of revenue management questions in which you will identify optimal prices under various circumstances. We will use Excel.

TUTORIAL Risk and Revenue Management (Miranda Meuwissen/Yann de Mey)
In this tutorial we will discuss multiple risk and revenue management examples, from various types of products and under various supply and demand circumstances. We will also consider linkages with other topics in the course.

WEEK 5.

LECTURE Information technology for supply chain management (Cor Verdouw)
A supply chain cannot function as an organic whole without having the equivalent of a central nervous system. That system is its information system, supported by Information and Communication Technology (ICT or IT for short).
This lecture will discuss the fundamentals of an supply chain information system to support a rapid, error-free, efficient and safe information exchange between supply chain participants. It will introduce some enabling systems such as Enterprise Resource Planning systems, Electronic Data Interchange, Tracking and Tracing and RFID. Furthermore, the impact of Internet of Things and Big Data will be highlighted.

Read in advance:
- Chapter A, Online Chapter (Information Technology in a Supply Chain)
- Parts of the paper 'Defining and analyzing traceability systems in food supply chains' by H. Scholten et al. (will be uploaded on Blackboard)

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LECTURE Design supply chain information systems (Cor Verdouw)
Food supply chains are complex dynamic systems. As a consequence, the development and implementation of supply chain information systems is a challenging task. An essential starting point to successfully accomplish this task is to systematically map food supply chains. In this lecture, we will introduce a method to model supply chain processes at different levels of abstraction. We will use the Supply Chain Operations Reference Model as a reference.

Read in advance:
- Supply-Chain Operations Reference-model Overview and Reference Guide (provided on Blackboard)

PRACTICAL Information technology in a supply chain (Sjoukje Osinga)
This practical will apply the supply chain modelling method as introduced in the lecture 'Design supply chain information systems' to a pork supply chain. The students will try their hand at simple examples and will model different types of process models in Visio. This practical will take 4 hours.

TUTORIAL Information technology in a supply chain (Sjoukje Osinga)
In this tutorial we will focus on lessons learned in the practical and on the links with other topics in the course. Furthermore, we will work through some examples of exam questions.

WEEK 6.

LECTURE Planning in the supply chain (Sjoukje Osinga)
We will discuss the different planning levels for a company. Focus will be on the aggregate planning problem that determines, given the demand forecasts, the production level, inventory level, and the capacity level for each period that maximizes the firm's (supply chain's) profit over the planning horizon. We will also discuss Sales and Operations Planning (S&OP); an integrated business management process which aims to achieve focus, alignment and synchronization among all functions of the organization. Sales activities to promote products and change demand, should be aligned to production (supply) strategies.

Read in advance:
- Chapter 8 (Aggregate Planning in a supply chain)
- Chapter 9 (Sales and Operations Planning)

LECTURE The role of marketing strategy in the supply chain (Andres Trujillo Barrera)
This lecture aims at understanding the role of marketing in a supply chain.
We review a number of state-of-the art marketing models and their relationship with supply chain management. We aim to develop a better understanding of how to achieve customer satisfaction and to enhance firm performance. Topics include marketing channel determination, marketing capabilities (market orientation, relationship management) resource attraction, interfunctional coordination, and branding.

LECTURE Organisation of demand orientated supply chains (Jacques Trienekens)
This lecture will focus on the organisation of market orientated food supply chains, while we will approach supply chains as goal-orientated business networks. The lecture will present different supply chain organisation cases supported by concepts from supply chain organisation theory.

LECTURE Closure (ORL, BEC, INF)
At the Introduction lecture a closure assignment is provided. Every pair of students has uploaded a Powerpoint slide according to the assignment. During the lecture a selection of these slides will be discussed. The best slide will be rewarded with a small prize.

Course Schedule YSS-32806 Advanced Supply Chain Management   2018

	Monday *Leeuwenborch C63*	Tuesday *Orion C1040*	Wednesday	Thursday	Friday *Orion C3034*
Week 29 (March 19-23)	LECTURE 13:30 – 15:15 Introduction (KP) LECTURE 15:30 – 17:15 Designing the supply chain network (JB)	LECTURE 15:30 – 17:15 Logistic Network Configurations (JB)	GAME 13:30 – 17:15 *Orion PC3031* Beer Game by Slimstock	PRACTICALS 13:30 – 17:15 *Orion PC3031* Logistic Network Configurations (RA/KP)	TUTORIAL 13:30 – 15:15 Group 1 (RA) TUTORIAL 15:30 – 17:15 Group 2 (RA)
Week 30 (March 26-30)	LECTURE 13:30 – 15:15 Inventory management (KP)	LECTURE 15:30 – 17:15 Inventory management (KP)	PRACTICALS 13:30 – 17:15 *Orion PC3031* Inventory mgt (KP)	TUTORIAL 13:30 – 15:15 *Forum C314* Group 1 (KP) TUTORIAL 15:30 – 17:15 *Forum C314* Group 2 (KP)	GOOD FRIDAY
Week 31 (April 2-6)	EASTER	LECTURE 13:30 – 15:15 ***Orion C2030*** Financial management: value chain finance (MM) LECTURE 15:30 – 17:15 ***Orion C1040*** Financial man.: financing foreign transactions (YM)	LECTURE 13:30 – 15:15 *Leeuwenborch C63* Guests from Slimstock	PRACTICALS 13:30 – 17:15 *Orion PC3031* Financial Management (MM, YM)	TUTORIAL 13:30 – 15:15 Group 1 (YM) TUTORIAL 15:30 – 17:15 Group 2 (MM)
Week 32 (April 9-13)	LECTURE 13:30 – 15:15 Risk Management (YM)	LECTURE 15:30 – 17:15 Revenue Management (MM)	PRACTICALS 13:30 – 17:15 *Orion PC3031* Risk and Revenue Management (MM, YM)	INAUGURAL LECTURE 16:00 *Aula* Miranda Meuwissen	TUTORIAL 13:30 – 15:15 Group 1 (YM) TUTORIAL 15:30 – 17:15 Group 2 (MM)
Week 33 (April 16-20)	LECTURE 13:30 – 15:15 IT for supply chain management (CV)	LECTURE 15:30 – 17:15 Design supply chain information systems (CV)	LECTURE 13:30 – 15:15 *Leeuwenborch C63* Guest INF	PRACTICALS 13:30 – 17:15 *Orion PC3031* Information Technology (SO)	TUTORIAL 13:30 – 15:15 Group 1 (SO) TUTORIAL 15:30 – 17:15 Group 2 (SO)
Week 34 (April 23-27)	LECTURE 13:30 – 15:15 Planning in the supply chain (SO)	LECTURE 15:30 – 17:15 The role of marketing strategy in the supply chain (AT)	LECTURE 13:30 – 15:15 *Leeuwenborch C63* Organisation of demand oriented supply chains (JT)	LECTURE 13:30 – 15:15 *Orion C1040* Closure (YM, CV, KP)	KONINGSDAG
Week 36	Exam: Wednesday May 9, 13:30 – 16:30 hours, C4 (Bongerd)				

JB	Prof Dr Jacqueline Bloemhof	MM	Prof Dr ir Miranda Meuwissen	CV	Dr Cor Verdouw	AT	Dr Andres Trujillo Barrera	KP	Dr Karin Pauls
RA	Dr Renzo Akkerman	YM	Dr ir Yann de Mey	SO	Dr Sjoukje Osinga	JT	Prof Dr Jacques Trienekens		

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